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The tomographic image external input part 312-3 writes data to the diagnostic image sequence file 312-12. The resolution matching processing part 112-4 reads data from the diagnostic image sequence file 312-12 and the comparison image sequence file 312-13. In addition, the resolution matching processing part 312-4 writes in the correction image sequence file 312-14 of comparison images. The shift correction processing part 312-6 corrects shift between the diagnostic image and the comparison image based on the bed position. The projection image generation processing part 312-7 and the display processing part 312-11 read data from the diagnostic image sequence file 312-12 and the correction image sequence file 312-14 of comparison images.

IN THE CLAIMS:

Without prejudice, please cancel claims 5, 11, 27, 30 and 39, and please amend/replace the claims as follows:

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1. (Amended) A tomographic image reading method for extracting a comparison image corresponding to a diagnostic image, and displaying the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said method comprising the steps of:

inputting said first tomographic images and said second tomographic images;  
generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;

correcting the slice position according to said shift amount between said first

projection image and said second projection image; and

displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

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2. (Amended) An image alignment method for extracting a comparison image corresponding to a diagnostic image and displaying the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said method comprising the steps of:

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inputting said first tomographic images and said second tomographic images;  
aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;

correcting the slice position according to said shift amount between said first projection image and said second projection image; and

displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

3. (Amended) A tomographic image reading method for extracting a comparison

image corresponding to a diagnostic image. and displaying the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said method comprising the steps of:

inputting said first tomographic images and said second tomographic images;  
generating a first projection image from said first tomographic images and a second projection image from said second tomographic images;  
measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;  
correcting the slice position according to said shift amount between said first projection image and said second projection image;  
displaying said diagnostic image and said comparison image at a corrected slice position to a monitor; and  
adjusting positions of said diagnostic image and said comparison image which are displayed;

wherein a MIDI signal constructing method is used for the adjusting step, said MIDI signal constructing method comprising the steps of:

providing  $n$  different MIDI channels or control numbers or combinations of them for a signal  $x$  which has  $128 \times n$  stages in which  $n$  is a positive integer;  
assuming said MIDI channels or said control numbers or said combinations as  $p=1, 2, \dots, n$ ;  
dividing said signal  $x$  into 128 parts  $W(l)$  ( $l; 0 \leq l \leq 127$ ) in ascending order and assigning  $p$  which is equal to  $r+1$  ( $r; 0 \leq r < n$ ) to said signal  $x$  which is equal to  $128n + r$ ; and  
constructing and sending a MIDI control change message in which a control value is 1 by using a MIDI channel or control number corresponding to  $p$ .

4. (Amended) An image alignment method for extracting a comparison image corresponding to a diagnostic image and displaying the images, said diagnostic image being a

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slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said method comprising the steps of:

inputting said first tomographic images and said second tomographic images;  
aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

generating a first projection image of the X axial direction from said first tomographic images and generating a second projection image of the X axial direction from said second tomographic images;

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measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;

correcting the slice position according to said shift amount between said first projection image and said second projection image; and

displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

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6. (Amended) A slice image automatic alignment method for extracting a comparison image corresponding to a diagnostic image, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said method comprising the steps of:

inputting said first tomographic images and said second tomographic images;  
aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are

different;

generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists; and

correcting the slice position according to said shift amount between said first projection image and said second projection image.

10. (Amended) A slice image automatic alignment method for extracting a comparison image corresponding to a diagnostic image, said diagnostic image being a slice image which is one of first tomographic images; said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said method comprising the steps of:

inputting said first tomographic images and said second tomographic images; aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

generating a first projection image of the X axial direction from said first tomographic images and generating a second projection image of the X axial direction from said second tomographic images;

measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists; and

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correcting the slice position according to said shift amount between said first projection image and said second projection image.

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24. (Amended) A tomographic image reading apparatus for extracting a comparison image corresponding to a diagnostic image and displaying the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said apparatus comprising:

inputting means for inputting said first tomographic images and said second tomographic images;

projection image generation means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

template generation means for generating a template from said first projection image such that said template includes an area in which a specific object image exists;

matching means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as said template;

slice position correcting means for correcting the slice position according to said shift amount between said first projection image and said second projection image; and

displaying means for displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

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25. (Amended) An image alignment apparatus for extracting a comparison image corresponding to a diagnostic image and displaying the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said apparatus comprising:

inputting means for inputting said first tomographic images and said second tomographic images;

resolution aligning means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

projection image generation means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

template generation means for generating a template from said first projection image such that said template includes an area in which a specific object image exists;

matching means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as said template by performing pattern matching while shifting said template by an interval;

slice position correcting means for correcting the slice position according to said shift amount between said first projection image and said second projection image; and

displaying means for displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

26. (Amended) An image alignment apparatus for extracting a comparison image corresponding to a diagnostic image and displaying the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said apparatus comprising:

inputting means for inputting said first tomographic images and said second tomographic images;

resolution aligning means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said

second tomographic images are different;

projection image generation means for generating a first projection image of the X axial direction from said first tomographic images and generating a second projection image of the X axial direction from said second tomographic images;

template generation means for generating a template from said first projection image such that said template includes an area in which a specific object image exists;

matching means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as said template by performing pattern matching while shifting said template by an interval;

slice position correcting means for correcting the slice position according to said shift amount between said first projection image and said second projection image; and

displaying means for displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

28. (Amended) A slice image automatic alignment apparatus for extracting a comparison image corresponding to a diagnostic image, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said apparatus comprising:

inputting means for inputting said first tomographic images and said second tomographic images;

resolution aligning means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

projection image generation means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

template generation means for generating a template from said first projection



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image such that said template includes an area in which a specific object image exists;  
matching means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as said template by performing pattern matching while shifting said template by an interval; and

slice position correcting means for correcting the slice position according to said shift amount between said first projection image and said second projection image.

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29. (Amended) A slice image automatic alignment apparatus for extracting a comparison image corresponding to a diagnostic image, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said apparatus comprising:

inputting means for inputting said first tomographic images and said second tomographic images;

resolution aligning means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

projection image generation means for generating a first projection image of the X axial direction from said first tomographic images and generating a second projection image of the X axial direction from said second tomographic images;

template generation means for generating a template from said first projection image such that said template includes an area in which a specific object image exists;

matching means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as said template by performing pattern matching while shifting said template by an interval; and

slice position correcting means for correcting the slice position according to said shift amount between said first projection image and said second projection image.

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31. (Amended) A computer readable medium storing program code for causing a computer to extract a comparison image corresponding to a diagnostic image and to display the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said computer readable medium comprising:

program code means for inputting said first tomographic images and said second tomographic images;

program code means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

98

program code means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;

program code means for correcting the slice position according to said shift amount between said first projection image and said second projection image; and

program code means for displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

32. (Amended) A computer readable medium storing program code for causing a computer to extract a comparison image corresponding to a diagnostic image and to display the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said computer readable medium comprising:

program code means for inputting said first tomographic images and said second tomographic images;

program code means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic

images when the resolutions of said first tomographic images and said second tomographic images are different;

program code means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

program code means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;

program code means for correcting the slice position according to said shift amount between said first projection image and said second projection image; and

program code means for displaying said diagnostic image and said comparison image at a corrected slice position to a monitor.

33. (Amended) A computer readable medium storing program code for causing a computer to extract a comparison image corresponding to a diagnostic image and to display the images, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said computer readable medium comprising:

program code means for inputting said first tomographic images and said second tomographic images;

program code means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

program code means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images;

program code means for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area

as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists;

program code means for correcting the slice position according to said shift amount between said first projection image and said second projection image;

program code means for displaying said diagnostic image and said comparison image at a corrected slice position to a monitor; and

adjusting program code means for adjusting positions of said diagnostic image and said comparison image which are displayed;

wherein a MIDI signal constructing program code means is used for adjusting program code means, said MIDI signal constructing program code means including:

program code means for providing  $n$  different MIDI channels or control numbers or combinations of them for a signal  $x$  which has  $128 \times n$  stages in which  $n$  is a positive integer;

program code means for assuming said MIDI channels or said control numbers or said combinations as  $p=1, 2, \dots, n$ ;

program code means for dividing said signal  $x$  into 128 parts  $W(l)$  ( $l; 0 \leq l \leq 127$ ) in ascending order and assigning  $p$  which is equal to  $r+1$  ( $r; 0 \leq r < n$ ) to said signal  $x$  which is equal to  $l \times n + r$ ; and

program code means for constructing and sending a MIDI control change message in which a control value is 1 by using a MIDI channel or control number corresponding to  $p$ .

34. (Amended) A computer readable medium storing program code for causing a computer to extract a comparison image corresponding to a diagnostic image, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said computer readable medium comprising:

program code means for inputting said first tomographic images and said second tomographic images;

program code means for aligning resolutions of said first tomographic images

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and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

program code means for generating a first projection image from said first tomographic images and a second projection image from said second tomographic images, wherein the direction of projection for generating each of said first and second projection images is perpendicular to the Z axial direction;

program code mean for measuring shift amount between said first projection image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template. being generated from said first projection image such that said template includes an area in which a specific object image exists; and

program code means for correcting the slice position according to said shift amount between said first projection image and said second projection image.

38. (Amended) A computer readable medium storing program code for causing a computer to extract a comparison image corresponding to a diagnostic image, said diagnostic image being a slice image which is one of first tomographic images, said comparison image being a slice image which is one of second tomographic images which are taken at the time different from the time when the first tomographic images are taken, body section being a slice plane in the X-Y axial direction and body axis being in the Z axial direction, said computer readable medium comprising:

program code means for inputting said first tomographic images and said second tomographic images;

program code means for aligning resolutions of said first tomographic images and said second tomographic images by scaling one or both of said tomographic images when the resolutions of said first tomographic images and said second tomographic images are different;

program code means for generating a first projection image of the X axial direction from said first tomographic images and generating a second projection image of the X axial direction from said second tomographic images;

program code means for measuring shift amount between said first projection

image and said second projection image by searching said second projection image for the same area as a template by performing pattern matching while shifting said template by an interval, said template being generated from said first projection image such that said template includes an area in which a specific object image exists; and  
program code means for correcting the slice position according to said shift amount between said first projection image and said second projection image.

Please add new claims 50 to 54 as follows:

50. (New) The image alignment method as claimed in claim 4, said method further comprising the step of finding a reference position in the Y axial direction for the projection images or for the tomographic images and correcting shift in the Y axial direction on the basis of said reference position.

51. (New) The slice image automatic alignment method as claimed in claim 10, said method comprising the step of finding a reference position in the Y axial direction for the projection images or the tomographic images and correcting shift in the Y axial direction on the basis of said reference position.

52. (New) The image alignment apparatus as claimed in claim 26, said apparatus further comprising:

reference position recognition means for finding a reference position in the Y axial direction for the tomographic images or the projection images; and

shift correcting means for correcting shift in the Y axial direction on the basis of said reference position.

53. (New) The slice image automatic alignment apparatus as claimed in claim 29, said apparatus further comprising:

reference position recognition means for finding a reference position in the Y axial direction for the tomographic images or the projection images; and

shift correcting means for correcting shift in the Y axial direction on the basis of said reference position.